

I/We claim

1. A process for enhancing the oil recovery from an oil well by proliferation of microbial consortium at a temperature upto 90°C, the said process comprising steps of:

- 5        a) inoculating the microbial consortium wherein the said consortium having accession no MTCC S2-001 deposited with Institute of Microbial Technology, in a nutrient medium I in the presence of an anaerobic gas mixture of N<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>;
  - 10      b) incubating the microbial consortium of step(a) at a temperature up to 90°C to obtain seed population of microbial consortium;
  - c) inoculating microbial consortium of step (b) under aseptic condition in to a nutrient medium II to obtain a biological solution;
  - 15      d) injecting the biological solution of step (c) in to the oil well, followed by injecting water into the oil well to push the entire biological solution in to the pores of the oil well, allowing the microbial consortium to proliferate which dissociates the oil, and
  - e) obtaining the enhanced oil recovery from oil wells.
2. A process as claimed in claim 1, wherein the said microbial consortium comprises of anaerobic bacteria
- 20 3. A process as claimed in claim 1, wherein the said microbial consortium comprises of anaerobic bacteria selected from the group consisting of *Thermoanaerobacterium sp.*, *Thermotoga sp.* and *Thermococcus sp.*
4. A process as claimed in claim 1, wherein the nutrient medium I comprises of:

Mineral nutrients	Quantity/Litre
MgSO <sub>4</sub> .7H <sub>2</sub> O	0.5 to 1.5 g
K <sub>2</sub> HPO <sub>4</sub>	0.4 to 0.6 g
KH <sub>2</sub> PO <sub>4</sub>	0.1 to 0.6 g
<b>Nitrogenous substrates</b>	
NH <sub>4</sub> Cl	0.5 to 1.5 g
Yeast extract	1.0 to 4.0 g

Tryptone	0.5 to 1.0 g
<b>Reducing agents</b>	
Cystein HCL	1.0 to 5.0 g
Na <sub>2</sub> S.9H <sub>2</sub> O	2.0 to 5.0
<b>Carbon Source</b>	
Molasses	50.0 to 100 g
Corn steep liquor	50.0 to 100 g
<b>Buffering agent</b>	
NaHCO <sub>3</sub>	1.0 to 2.5 g
Vitamin stock solution	10 to 20 ml
Trace mineral stock solution	15 to 20 ml

5. A process as claimed in claim 1, wherein the nutrient medium II comprises of:

Mineral nutrients	Quantity/Litre
MgSO <sub>4</sub> .7H <sub>2</sub> O	0.05 to 0.15 g
K <sub>2</sub> HPO <sub>4</sub>	0.2 to 0.4 g
KH <sub>2</sub> PO <sub>4</sub>	0.2 to 0.4 g
<b>Nitrogenous substrates</b>	
NH <sub>4</sub> Cl	0.5 to 1.5 g
<b>Reducing agents</b>	
Cystein HCL	0.1 to 0.5 g
Na <sub>2</sub> S.9H <sub>2</sub> O	0.1 to 0.5 g
<b>Carbon Source</b>	
Molasses	15.0 to 30.0 g
Corn steep liquor	50-100 g
<b>Buffering agent</b>	
NaHCO <sub>3</sub>	1.0 to 2.5 g
Vitamin stock solution	5 to 10 ml
Trace mineral stock solution	5 to 10 ml

- 5 6. A process as claimed in claims 2 and 3, wherein the trace mineral solution of nutrient media I and II having a pH in the range of 6.50 to 7.50 comprises of:-

Chemicals	Quantity per litre
Nitrolotriacetic acid (sodium salt)	0.82 to 2.00 g
MgSO <sub>4</sub>	2.5 to 3.2 g
MnSO <sub>4</sub> .2H <sub>2</sub> O	0.2 to 0.8 g
NaCl	0.7 to 1.2 g
FeSO <sub>4</sub> .7H <sub>2</sub> O	0.05 to 0.12 g
CoCl <sub>2</sub> /CoSO <sub>4</sub>	0.07 to 0.14 g
ZnSO <sub>4</sub>	0.08 to 0.12 g
CuSO <sub>4</sub> .5H <sub>2</sub> O	0.008 to 0.015 g
AlK (SO <sub>4</sub> ) <sub>2</sub>	0.007 to 0.015 g
H <sub>3</sub> BO <sub>3</sub>	0.009 to 0.012 g
Na <sub>2</sub> MoO <sub>4</sub> .2H <sub>2</sub> O	0.008 to 0.13 g

7. A process as claimed in claims 2 and 3 wherein the vitamin solution of nutrient media I and II having a pH in the range of 6.50 to 7.50 comprises of :

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Vitamin	Quantity mg/l
Biotin	1.2 to 2.2
Folic acid	1.7 to 2.4
Pyridoxine HC1	7.0 to 12.0
Thamine HC1	7.0 to 12.0
Riboflavin	6.0 to 7.0
Nicotinic acid	4.0 to 6.0
DL-Calcium Pentothenate	3.0 to 6.2
P-Aminobenzoic acid	4.1 to 5.6
Vitaminin B <sub>12</sub>	0.08 to 13.0
Lipoic acid	2.8 to 5.4

8. A process as claimed in claim 1, wherein the incubation temperature of the microbial consortium of step (b) is in the range of 70 to 90°C, preferably 90°C.
9. A process as claimed in claim 1, wherein the proliferation temperature of the microbial consortium of step (d) is in the range of 70 to 90°C.
10. A process as claimed in claim 1, wherein the oil recovery is enhanced up to 3 folds.

11. A process as claimed in claim 1, wherein the microbial consortium produces surfactants which act to dissociate the oil.
12. A process as claimed in claim 1, wherein the microbial consortium produces carbon dioxide and methane, which creates localized pressure in core rock pores and thus helps in sweeping the oil from the oil well.  
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13. A process as claimed in claim 1, wherein the microbial consortium produces volatile fatty acids which solubilize the rock surface and dislocate from oil bearing pores.
14. A process as claimed in claim 1, wherein the nutrient medium I is prepared by dissolving mineral nutrients, nitrogenous substances, reducing agents, buffering agent, carbon source and trace mineral in water, adjusting the pH in the range 7.0 to 7.5; autoclaving the solution at a temperature in the range of 120°-125°C, at a pressure of 15-20 psi for a time period of 20-25 minutes; maintaining the temperature of the solution up to 90°C, adding vitamin solution and adjusting the pH to 6.50 to 7.50 using an alkali to obtain nutrient medium.  
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15. A process as claimed in claim 1, wherein the nutrient medium II is prepared by dissolving mineral nutrients, nitrogenous substances, reducing agents, buffering agent, carbon source and trace mineral in formation water, adjusting the pH in the range 7.0 to 7.5; autoclaving the solution at a temperature in the range of 120°-125°C, at a pressure of 15-20 psi for a time period of 20-25 minutes; maintaining the temperature of the solution up to 90°C, adding vitamin solution and adjusting the pH to 6.50 to 7.50 using an alkali to obtain nutrient medium.  
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16. A process as claimed in claims 14 and 15, wherein the alkali used is selected from a group consisting of sodium hydroxide and potassium hydroxide.
- 20 17. A microbial consortium adapted for enhancing oil recovery from oil wells having accession no MTCC S2-001.
18. A microbial consortium as claimed in claim 17, wherein the said microbial consortium comprises of anaerobic bacteria.
- 25 19. A microbial consortium as claimed in claim 18, wherein the anaerobic bacteria are selected from the group consisting of *Thermoanaerobacterium sp.*, *Thermotoga sp.* and *Thermococcus sp.*